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EXAMINER	
VAN DOREN, BETH	

ART UNIT	PAPER NUMBER
3623	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/491,461	DAGUM ET AL.
	Examiner	Art Unit
	Beth Van Doren	3623

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *05 March 2004*.
2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.
3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-21* is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5)☐ Claim(s) _____ is/are allowed.
6)☒ Claim(s) *1-21* is/are rejected.
7)☐ Claim(s) _____ is/are objected to.
8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.
10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a)☐ All b)☐ Some * c)☐ None of:
1.☐ Certified copies of the priority documents have been received.
2.☐ Certified copies of the priority documents have been received in Application No. _____.
3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *03/05/2004*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. The following is a Final office action in response to communications received 03/05/2004. Claims 1, 12, and 21 have been amended. Claims 1-21 are pending in this application.

Response to Amendment

2. Applicant's amendments to the abstract are sufficient to overcome the specification objections set forth in the previous office action.

3. Applicant's amendments to claim 1, 12, and 21 are not sufficient to overcome the 35 USC § 101 rejections set forth in the previous office action. Therefore, these rejections are reasserted below and discussed in the section under the heading *Response to Arguments*.

Response to Arguments

4. Applicant's arguments with regards to the 35 USC § 101 rejections of the previous office action have been fully considered, but they are not persuasive.

Regarding the requirement under 35 U.S.C. § 101 that a claimed invention be limited to the technological arts in order to be deemed statutory and in response to Appellant's arguments found on pages 8-9 of the response, the Examiner submits that the phrase "technological arts" has been created and used by the courts to offer another view of the term "useful arts." See *In re Musgrave*, 167 USPQ (BNA) 280 (CCPA 1970). Hence, the first test of whether an invention is eligible for a patent is to determine if the invention is within the "technological arts."

Further, despite the express language of §101, several judicially created exceptions have been established to exclude certain subject matter as being patentable subject matter covered by §101. These exceptions include "laws of nature," "natural phenomena," and "abstract ideas."

See *Diamond v. Diehr*, 450, U.S. 175, 185, 209 USPQ (BNA) 1, 7 (1981). However, courts have found that even if an invention incorporates abstract ideas, such as mathematical algorithms, the invention may nevertheless be statutory subject matter if the invention as a whole produces a "useful, concrete and tangible result." See *State Street Bank & Trust Co. v. Signature Financial Group, Inc.* 149 F.3d 1368, 1973, 47 USPQ2d (BNA) 1596 (Fed. Cir. 1998). This addresses the second test under 35 U.S.C § 101 of whether or not an invention is eligible for a patent. The Manual of Patent Examining Procedure reiterates this point. More specifically, MPEP § 2106(II)(A) states, "The claimed invention as a whole must accomplish a practical application. That is, it must produce a 'useful, concrete and tangible result.' *State Street*, 149 F.3d at 1373, 47 USPQ2d at 1601-02." Furthermore, "Only when the claim is devoid of any limitation to a practical application in the technological arts should it be rejected under 35 U.S.C. 101." (MPEP § 2106(II)(A))

This "two prong" test was evident when the Court of Customs and Patent Appeals (CCPA) decided an appeal from the Board of Patent Appeals and Interferences (BPAI). See *In re Toma*, 197 USPQ (BNA) 852 (CCPA 1978). In *Toma*, the court held that the recited mathematical algorithm did not render the claim as a whole non-statutory using the Freeman-Walter-Abele test as applied to *Gottschalk v. Benson,* 409 U.S. 63, 175 USPQ (BNA) 673 (1972). Additionally, the court decided separately on the issue of the "technological arts." The court developed a "technological arts" analysis:

> The "technological" or "useful" arts inquiry must focus on whether the claimed subject matter...is statutory, not on whether the product of the claimed subject matter...is statutory, not on whether the prior art which the claimed subject matter purports to replace...is statutory, and not on whether the claimed subject matter is presently perceived to

> be an improvement over the prior art, e.g., whether it "enhances" the operation of a machine. *In re Toma* at 857.

In *Toma*, the claimed invention was a computer program for translating a source human language (e.g., Russian) into a target human language (e.g., English). The court found that the claimed computer implemented process was within the "technological art" because the claimed invention was an operation being performed by a computer within a computer.

The decision in *State Street Bank & Trust Co. v. Signature Financial Group, Inc.* never addressed this prong of the test. In *State Street Bank & Trust Co.,* the court found that the "mathematical exception" using the Freeman-Walter-Abele test has little, if any, application to determining the presence of statutory subject matter but rather, statutory subject matter should be based on whether the operation produces a "useful, concrete and tangible result." See *State Street Bank & Trust Co.* at 1374. Furthermore, the court found that there was no "business method exception" since the court decisions that purported to create such exceptions were based on novelty or lack of enablement issues and not on statutory grounds. Therefore, the court held that "[w]hether the patent's claims are too broad to be patentable is not to be judged under §101, but rather under §§102, 103 and 112." See *State Street Bank & Trust Co.* at 1377. Both of these analyses go towards whether the claimed invention is non-statutory because of the presence of an abstract idea. *State Street* never addressed the first part of the analysis, i.e., the "technological arts" test established in *Toma* because the invention in *State Street* (i.e., a computerized system for determining the year-end income, expense, and capital gain or loss for the portfolio) ***was already determined to be within the technological arts*** under the *Toma* test. This dichotomy has been recently acknowledged by the Board of Patent Appeals and Interferences in affirming a

§101 rejection finding the claimed invention to be non-statutory for failing the technological arts test. See *Ex parte Bowman*, 61 USPQ2d (BNA) 1669 (BdPatApp&Int 2001).

What is indeed important to note in the *Bowman* decision is that the Board acknowledged the dichotomy of the analysis of the claims under 35 U.S.C. § 101, thereby emphasizing the fact that not only must the claimed invention produce a "useful, concrete and tangible result," ***but that it must also be limited to the technological arts*** in order to be deemed statutory under the guidelines of 35 U.S.C. § 101. The Board very explicitly set forth this point:

> [1] We agree with the examiner. Appellant has carefully avoided tying the disclosed and claimed invention to any technological art or environment. As noted by the examiner, the disclosed and claimed invention is directed to nothing more than a human making mental computations and manually plotting the results on a paper chart [answer, page 5]. The Examination Guidelines for Computer-Related Inventions are not dispositive of this case because there is absolutely no indication on this record that the invention is connected to a computer in any manner.
>
> Despite the express language of 35 U.S.C. §101, several judicially created exceptions have been excluded from subject matter covered by Section 101. These exceptions include laws of nature, natural phenomenon, and abstract ideas. *See Diamond v. Diehr*, 450 U.S. 175, 185, 209 USPQ 1, 7(1981). We interpret the examiner's rejection as finding that the claimed invention before us is nothing more than an abstract idea because it is not tied to any technological art or environment. Appellant's argument is that the physical (even manual) creation of a chart and the plotting of a point on this chart places the invention within the technological arts.
>
> The phrase "technological arts" has been created to offer another view of the term "useful arts." The Constitution of the United States authorizes and empowers the government to issue patents only for inventions which promote the progress [of science and] the useful arts. We find that the invention before us, as disclosed and claimed, does not promote the progress of science and the useful arts, and does not fall within the definition of technological arts. The abstract idea which forms the heart of the invention before us does not become a technological art merely by the recitation in the claim of "transforming physical media into a

> chart" [sic, drawing or creating a chart] and "physically plotting a point on said chart."
>
> In summary, we find that the invention before us is nothing more than an abstract idea which is not tied to any technological art, environment, or machine, and is not a useful art as contemplated by the Constitution of the United States. The physical aspects of claim 1, which are disclosed to be nothing more than a human manually drawing a chart and plotting points on this chart, do not automatically bring the claimed invention within the technological arts. For all these reasons just discussed, we sustain the examiner's rejection of the appealed claims under 35 U.S.C. §101. *See Ex parte Bowman*, 61 USPQ2d (BNA) 1669, 1671 (BdPatApp&Int 2001)

Similarly, in the present application, claims 1-21 are deemed to be non-statutory because they are not limited to the technological arts; all recited steps could be performed manually by a human, thereby reinforcing the fact that Applicant's invention fails to "[p]romote the progress of science and useful arts," as intended by the United States Constitution under Art. I, §8, cl. 8 regarding patent protection.

In conclusion, the Examiner submits that Applicant's claims do not meet the technological arts requirement under 35 U.S.C. § 101, as articulated in *Musgrave, Toma,* and *Bowman* as well as the Manual of Patent Examining Procedure.

5. Applicant's arguments with regards to the rejections based on Dietrich et al. (U.S. 5,630,070) have been fully considered, but they are not persuasive. In the remarks, Applicant argues that (1) Dietrich et al. does not teach or suggest "converting an expected value function associated with the resources and products into a closed form expression" because Dietrich is not equipped to handle and does not allow for non-linear functions as an expected value function, (2) Dietrich et al. teaches LP optimization which only optimizes objective functions in the family of

linear functions and therefore Dietrich does not teach or suggest the claimed invention, and (3) Dietrich et al. does not teach or suggest a method for optimizing a multivariate representation of resources.

In response to argument (1), Examiner respectfully disagrees. Examiner points out that the claims broadly recite "expected value function" without any recitation of the specific function on which the claims rely. In the mathematical arts, an expected value function is not limited to be a non-linear function, but rather the term broadly refers to the expected outcome concerning some function *X*. Dietrich et al. does discuss the expected outcome of a function as it varies based on the possibilities of the variables contained therein, as discussed in at least column 3, lines 50-65, column 4, lines 15-40, column 9, lines 55-65, column 10, equations 1 and 2, lines 5-20 and 26-30, column 11, lines 65-67, column 12, lines 1-20 and 45-60. This expected value function is transformed into a closed form expression so it can be solved.

Examiner notes above that the feature upon which applicant relies (i.e., non-linear expected value functions) is not recited in the rejected claims. Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). If the Applicant requires that the expected value function of the claims is a non-linear value function, Examiner suggests clear recitation of this in the claims so that it may receive patentable weight.

In response to argument (2), Examiner reasserts the comments made with regards to argument (1). Since linear functions are not precluded from expected value functions, and since Dietrich et al. does discuss the expected outcome of a function as it varies based on the possibilities of the variables contained therein, Examiner respectfully disagrees.

In response to argument (3), Examiner respectfully disagrees. First, Dietrich et al. discloses one of its main purposes being to provide optimal resource allocations, as discussed in column 2, lines 55-67, and Dietrich et al. performs this optimal resource allocation using a representation of the resources that involves multiple variables. Second, the limitation "a method for optimizing a multivariate representation of resources" appears in the preamble of the claims. A preamble is generally not accorded any patentable weight where it merely recites the purpose of a process or the intended use of a structure, and where the body of the claim does not depend on the preamble for completeness but, instead, the process steps or structural limitations are able to stand alone. See *In re Hirao*, 535 F.2d 67, 190 USPQ 15 (CCPA 1976) and *Kropa v. Robie*, 187 F.2d 150, 152, 88 USPQ 478, 481 (CCPA 1951). The body of the claims recite limitations such as "determining the optimum level of resources as a function of the solved for maximums" and "solving the equilibrium configuration to determine the optimization of the expected value function", both of which are taught by Dietrich et al. in at least column 3, lines 55-65, column 4, lines 15-40, column 11, lines 65-67, column 12, lines 1-20 and 45-60, column 13, lines 1-11 and 32-45, column 14, lines 15-26, and column 15, lines 1-15, wherein multivariate equations are optimized based on constraints and the maximum amount of each product associated with the variables is determined for the optimal outcome (an optimal outcome being, for example, lower costs, higher profit, etc.).

Claim Rejections - 35 USC § 101

6. 35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claims 1-21 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.

The basis of this rejection is set forth in a two-prong test of:

(1) whether the invention is within the technological arts; and

(2) whether the invention produces a useful, concrete, and tangible result.

For the claimed invention to be statutory, the claimed invention must be within the technological arts. Mere ideas in the abstract (i.e. abstract idea, laws of nature, natural phenomena) that do not apply, use, or advance the technological arts fail to promote the "progress of science and the useful arts" (i.e. the physical sciences as opposed to social sciences, for example) and therefore are found to be non-statutory subject matter. For a process claim to pass muster, the recited process must somehow apply, involve, use, or advance the technological arts.

In the present case, claims 1-21 only recite an abstract idea. The recited steps of merely modeling a mathematical relationship and performing a mathematical analysis to solve the relationship does not apply, use, or advance the technological arts since all of the recited steps can be performed without the use of technology. Therefore, since claims 1- 21 only constitute an abstract idea of how to setup and manipulate a mathematical expression, and since the claims do not apply, involve, use, or advance a technological art, it is respectfully submitted that the claimed invention is directed towards non-statutory subject matter.

As to the recitation in the preamble of "automated", mere recitation in the preamble (i.e. intended or field of use) or mere implication of employing a machine or article of manufacture to perform some or all of the recited steps does not confer statutory subject matter to an otherwise

abstract idea unless there is positive recitation in the claim as a whole to breathe life and meaning to the preamble.

Additionally, for a claimed invention to be statutory, the claimed invention must also produce a useful, concrete, and tangible result. In the present case, the invention of claims 1-21 produces and manipulates a mathematical expression to produce optimal levels of resources.

Although the recited process produces a useful, concrete, and tangible result, since the claimed invention, as a whole, is not within the technological arts as explained above, claims 1-21 are deemed to be directed towards non-statutory subject matter.

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-10, 12, 14, and 16-21 are rejected under 35 U.S.C. 102(b) as being anticipated by Dietrich et al. (U.S. 5,630,070).

8. As per claim 1, Dietrich et al. teaches a method for optimizing a multivariate representation of resources which are used in producing a set of products, the resources, products and their respective connectivities being represented in a product space plan, the method comprising:

converting an expected value function associated with the resources and products into a closed form expression (See at least figures 7-10, column 3, lines 50-65, column 4, lines 15-40, column 6, lines 25-35 and 40-60, column 7, lines 6-25, column 9, lines 11-31 and 55-65, column

10, equations 1 and 2, lines 5-20 and 26-30, column 11, lines 65-67, column 12, lines 1-20, wherein an expected value function is formed for the resources and products. The expected value function is transformed into a closed form expression so it can be solved);

transforming the product space plan into a working transformed space plan, wherein the products are transformed into working elements (See at least figures 7-10, column 3, lines 50-65, column 4, lines 15-40, column 6, lines 25-35 and 40-60, column 7, lines 6-25, column 9, lines 11-31 and 55-65, column 10, equations 1 and 2, lines 5-20 and 26-30, column 11, lines 65-67, column 12, lines 1-20, wherein the connections and relationships between products and resources represent a product space plan and this plan becomes a working plan in the equations created. The products become the variables that are worked in the equations);

performing a load step to form elemental blocks as a function of a single variable with elements being loaded with resources that gate production of the elements (See at least figures 7-10, column 4, lines 15-40, column 9, lines 11-31 and 55-65, column 10, equations 1 and 2, lines 5-20 and 26-30, column 11, lines 65-67, column 12, lines 1-20, column 13, lines 1-11 and 32-40, wherein a variable, such as eggs, is loaded with a value that represents the resources available. The available resources constrain the production of the elements (or products));

performing a re-loading step to form elemental blocks as a function of a single variable with elements being reloaded with resources that gate production of the element (See at least figures 7-10, column 4, lines 15-40, column 11, lines 65-67, column 12, lines 1-20, column 13, lines 1-11 and 32-40, column 14, lines 15-26, and column 15, lines 1-15, wherein reloading occurs that adds product blocks in equations that represent the subassemblies, each equation a function of a single variable);

solving for the maximum of each elemental block over each associated single variable (See at least figures 7-10, column 3, lines 55-65, column 4, lines 15-40, column 11, lines 65-67, column 12, lines 1-20, column 13, lines 1-11 and 32-45, column 14, lines 15-26, and column 15, lines 1-15, wherein the equations are optimized based on constraints and preferences and the maximum of each product associated with the variables is determined for the wanted outcome (for example, lower costs, higher profit, etc.)); and

determining the optimum level of resources as a function of the solved for maximums (See at least figures 7-10, column 3, lines 55-65, column 4, lines 15-40, column 11, lines 65-67, column 12, lines 1-20, column 13, lines 1-11 and 32-45, column 14, lines 15-26, and column 15, lines 1-15, wherein the equations are optimized based on constraints and preferences and the maximum of each product associated with the variables is determined for the wanted outcome (for example, lower costs, higher profit, etc.)).

9. As per claim 2, Dietrich et al. discloses a method wherein the loading and re-loading steps result in an equilibrium configuration that provides the minimum amount of resources to produce any given amount of products across the whole plan (See at least figures 7-10, column 3, lines 55-65, column 4, lines 15-40, column 11, lines 65-67, column 12, lines 1-20, column 13, lines 1-11 and 32-45, column 14, lines 15-26, and column 15, lines 1-15, wherein the result of the loading and reloading produces an equation which is solved in an effort to reduce costs and use the minimum resources to satisfy the constraints).

10. As per claim 3, Dietrich et al. teaches a method wherein the loading step further includes:

sequentially looking at each present work element (See at least figures 7-10, column 3, lines 50-65, column 4, lines 15-40, column 6, lines 25-35 and 40-60, column 7, lines 6-25,

column 9, lines 11-31 and 55-65, column 10, equations 1 and 2, lines 5-20 and 26-30, wherein each present product is looked at);

determining if each associated resource gates production of the element (See at least column 7, lines 5-25, column 8, tables 1-4, column 9, lines 11-31 and 55-65, column 10, equations 1 and 2, lines 5-20 and 26-30, wherein it is determined what resources control production of the product and are needed to produce the product at the needed demand);

if gating occurs, then unloading the resource from a prior element if so loaded, and loading the resource onto the present element (See at least figures 7-10, column 3, lines 55-65, column 4, lines 15-40, column 11, lines 65-67, column 12, lines 1-20, column 13, lines 1-11 and 32-45, column 14, lines 15-26, and column 15, lines 1-15, wherein during the maximizing of the equations, resources are shifted and loaded onto some elements and taken from other elements based on the demand and associated constraints of the equations).

11. As per claim 4, Dietrich et al. teaches a method where the reloading step further includes:

sequentially looking at each present work element (See at least figures 7-10, column 3, lines 50-65, column 4, lines 15-40, column 6, lines 25-35 and 40-60, column 7, lines 6-25, column 9, lines 11-31 and 55-65, column 10, equations 1 and 2, lines 5-20 and 26-30, wherein each present product is looked at);

reloading each unloaded resource back onto the element (See at least figures 7-10, column 3, lines 55-65, column 4, lines 15-40, column 11, lines 65-67, column 12, lines 1-20, column 13, lines 1-11 and 32-45, column 14, lines 15-26, and column 15, lines 1-15, wherein optimization in the equations is based on constraints and iteratively trying different values of the

variables in the equations in an effort to satisfy all the constraints and maximize/minimize the overall outcome);

redetermining if the element is gated by each reloaded resource (See at least figures 7-10, column 3, lines 55-65, column 4, lines 15-40, column 11, lines 65-67, column 12, lines 1-20, column 13, lines 1-11 and 32-45, column 14, lines 15-26, and column 15, lines 1-15, wherein optimization in the equations is based on constraints and iteratively trying different values of the variables in the equations in an effort to satisfy all the constraints and maximize/minimize the overall outcome);

if the element is so gated, then merging the elements sharing each gating resource into a common elemental block which is a function of a single variable (See column 2, lines 60-67, and column 7, lines 5-25, which talks about products with common subassemblies).

12. As per claim 5, Dietrich et al. discloses a method wherein step of determining that gating occurs includes calculating a new maximum for the loaded element and determining if any remaining components further gate the maximum (See at least figures 7-10, column 3, lines 55-65, column 4, lines 15-40, column 11, lines 65-67, column 12, lines 1-20, column 13, lines 1-11 and 32-45, column 14, lines 15-26, and column 15, lines 1-15, wherein optimization in the equations is based on constraints and iteratively trying different values of the variables in the equations in an effort to satisfy all the constraints and maximize/minimize the overall outcome).

13. As per claim 6, Dietrich et al. discloses a method wherein the step of redetermining that gating occurs includes recalculating a new maximum for the reloaded element and determining if any remaining components further gate the maximum (See at least figures 7-10, column 3, lines 55-65, column 4, lines 15-40, column 11, lines 65-67, column 12, lines 1-20, column 13, lines 1-

11 and 32-45, column 14, lines 15-26, and column 15, lines 1-15, wherein optimization in the equations is based on constraints and iteratively trying different values of the variables in the equations in an effort to satisfy all the constraints and maximize/minimize the overall outcome).

14. As per claim 7, Dietrich et al. discloses a method wherein the step of merging the elements results in an elemental block that is a sub-plan of the overall plan, but which is a function of a single variable (See at least column 2, lines 58-67, column 6, lines 25-60, and column 7, lines 9-25, which discusses subassemblies that are sub-plans of the overall plan. See also at least columns 15 and 16, which discusses multi-period problems that show different periods as sub-plans of the overall plan. These multi-period results and loadings are merged together).

15. As per claim 8, Dietrich et al. discloses a method wherein the merged elements intersect at a common resource in the transformed spaces (See at least figures 7-10, column 3, lines 50-65, column 4, lines 15-40, column 6, lines 25-35 and 40-60, column 7, lines 6-25, column 9, lines 11-31 and 55-65, column 10, equations 1 and 2, lines 5-20 and 26-30, column 11, lines 65-67, column 12, lines 1-20, wherein the equations intersect at a common resource for which the equations are solved).

16. As per claim 9, Dietrich et al. discloses a method wherein the expected value function represents a statistical expectation of the value function at a given resource allocation and for a given demand distribution (See at least column 3, lines 50-65, column 4, lines 15-40, column 6, lines 25-35 and 40-60, column 8, tables 1-4, column 9, lines 11-31 and 55-65, column 10, equations 1 and 2, lines 5-20 and 26-30, column 11, lines 30-50 and 65-67, column 12, lines 1-20, wherein the expected value function is a mathematical expectation of the function at a known

resource allotment at a given demand (the demand and resources available are known and used to manipulate the function)).

17. As per claim 10, Dietrich et al. discloses a method wherein the transforming step involves taking a transformation of the product space to provide the working transformed space wherein the distribution induced on the resources is transformed into a distribution with zero mean and unit variance (See at least figures 7-10, column 3, lines 50-65, column 4, lines 15-40, column 6, lines 25-35 and 40-60, column 7, lines 6-25, column 9, lines 11-31 and 55-65, column 10, equations 1 and 2, lines 5-20 and 26-30, column 11, lines 65-67, column 12, lines 1-20, wherein the connections and relationships between products and resources represent a product space plan and this plan becomes a working plan in the equations created. The products become the variables that are worked in the equations. In order to solve the equations, the distribution of the resources must have a mean of 0 and unit differences).

18. As per claim 12, Dietrich et al. teaches a method for optimizing a multivariate expected value function which represents a statistical expectation of the value function at a given component allocation and for a given demand distribution, the method comprising:

forming a plan in the product space associated with the expected value function which represents products, components, and connectivities therebetween (See at least figures 7-10, column 3, lines 50-65, column 4, lines 15-40, column 6, lines 25-35 and 40-60, column 7, lines 6-25, column 9, lines 11-31 and 55-65, column 10, equations 1 and 2, lines 5-20 and 26-30, column 11, lines 65-67, column 12, lines 1-20, wherein an expected value function is formed for the resources and products. See at least figure 7 that shows the connectivities);

transforming the product space plan to form a corresponding working space plan, with products corresponding to elements such that the distribution induced on the resources is transformed into a distribution with zero mean and unit variance (See at least figures 7-10, column 3, lines 50-65, column 4, lines 15-40, column 6, lines 25-35 and 40-60, column 7, lines 6-25, column 9, lines 11-31 and 55-65, column 10, equations 1 and 2, lines 5-20 and 26-30, column 11, lines 65-67, column 12, lines 1-20, wherein the connections and relationships between products and resources represent a product space plan and this plan becomes a working plan in the equations created. The products become the variables that are worked in the equations. In order to solve the equations, the distribution of the resources must have a mean of 0 and unit differences);

converting the associated expected value function into a closed form expression (See at least figures 7-10, column 3, lines 50-65, column 4, lines 15-40, column 6, lines 25-35 and 40-60, column 7, lines 6-25, column 9, lines 11-31 and 55-65, column 10, equations 1 and 2, lines 5-20 and 26-30, column 11, lines 65-67, column 12, lines 1-20, wherein an expected value function is formed and the expected value function is transformed into a closed form expression so it can be solved);

performing a load step which loads each element with components that gate production of the element (See at least figures 7-10, column 4, lines 15-40, column 9, lines 11-31 and 55-65, column 10, equations 1 and 2, lines 5-20 and 26-30, column 11, lines 65-67, column 12, lines 1-20, column 13, lines 1-11 and 32-40, wherein each product is loaded with variables representing resources that control the outcome of the product);

performing a re-loading step which reloads components that were unloaded from an element in the loading step (See at least figures 7-10, column 4, lines 15-40, column 11, lines 65-67, column 12, lines 1-20, column 13, lines 1-11 and 32-40, column 14, lines 15-26, and column 15, lines 1-15, wherein subassemblies are reloaded as components);

merging elements that are further gated by components that were unloaded, with the loading, reloading, and merging steps resulting in an equilibrium configuration (See at least figures 7-10, column 3, lines 55-65, column 4, lines 15-40, column 11, lines 65-67, column 12, lines 1-20, column 13, lines 1-11 and 32-45, column 14, lines 15-26, and column 15, lines 1-15, wherein the equations produced are an equilibrium configuration); and

solving the equilibrium configuration to determine the optimization of the expected value function (See at least figures 7-10, column 3, lines 55-65, column 4, lines 15-40, column 11, lines 65-67, column 12, lines 1-20, column 13, lines 1-11 and 32-45, column 14, lines 15-26, and column 15, lines 1-15, wherein the equations are optimized based on constraints and preferences and the maximum of each product associated with the variables is determined for the wanted outcome (for example, lower costs, higher profit, etc.)).

19. As per claim 14, Dietrich et al. teaches a method wherein the multivariate demand distribution includes a multivariate normal distribution (See at least figures 7-10, column 3, lines 50-65, column 4, lines 15-40, column 6, lines 25-35 and 40-60, column 7, lines 6-25, column 9, lines 11-31 and 55-65, column 10, equations 1 and 2, lines 5-20 and 26-30, column 11, lines 65-67, column 12, lines 1-20, wherein the multivariate demand distribution of Dietrich et al. is a normal distribution. See column 8, table 2).

20. As per claim 16, Dietrich et al. teaches a method wherein the loading step includes:

sequentially analyzing each element in the plan (See at least figures 7-10, column 3, lines 50-65, column 4, lines 15-40, column 6, lines 25-35 and 40-60, column 7, lines 6-25, column 9, lines 11-31 and 55-65, column 10, equations 1 and 2, lines 5-20 and 26-30, wherein each present product is looked at);

determining if each associated component gates production of the element (See at least column 7, lines 5-25, column 8, tables 1-4, column 9, lines 11-31 and 55-65, column 10, equations 1 and 2, lines 5-20 and 26-30, wherein it is determined what resources control production of the product and are needed to produce the product at the needed demand);

if gating occurs, then unloading the component from a prior element if so loaded, and loading the component onto the present element (See at least figures 7-10, column 3, lines 55-65, column 4, lines 15-40, column 11, lines 65-67, column 12, lines 1-20, column 13, lines 1-11 and 32-45, column 14, lines 15-26, and column 15, lines 1-15, wherein during the maximizing of the equations, resources are shifted and loaded onto some elements and taken from other elements based on the demand and associated constraints of the equations).

21. As per claim 17, Dietrich et al. teaches method wherein the reloading includes:

sequentially analyzing each element in the plan (See at least figures 7-10, column 3, lines 50-65, column 4, lines 15-40, column 6, lines 25-35 and 40-60, column 7, lines 6-25, column 9, lines 11-31 and 55-65, column 10, equations 1 and 2, lines 5-20 and 26-30, wherein each present product is looked at);

reloading each unloaded component back onto the element (See at least figures 7-10, column 3, lines 55-65, column 4, lines 15-40, column 11, lines 65-67, column 12, lines 1-20, column 13, lines 1-11 and 32-45, column 14, lines 15-26, and column 15, lines 1-15, wherein

optimization in the equations is based on constraints and iteratively trying different values of the variables in the equations in an effort to satisfy all the constraints and maximize/minimize the overall outcome);

redetermining if the element is gated by each reloaded component (See at least figures 7-10, column 3, lines 55-65, column 4, lines 15-40, column 11, lines 65-67, column 12, lines 1-20, column 13, lines 1-11 and 32-45, column 14, lines 15-26, and column 15, lines 1-15, wherein optimization in the equations is based on constraints and iteratively trying different values of the variables in the equations in an effort to satisfy all the constraints and maximize/minimize the overall outcome).

22. As per claim 18, Dietrich et al. discloses a method wherein the equilibrium configuration includes configuring of the plan into elemental blocks which are a function of a single variable (See at least figures 7-10, column 3, lines 55-65, column 4, lines 15-40, column 11, lines 65-67, column 12, lines 1-20, column 13, lines 1-11 and 32-45, column 14, lines 15-26, and column 15, lines 1-15, wherein the equations produced are an equilibrium configuration which are each a function of a single variable, x).

23. As per claim 19, Dietrich et al. teaches a method wherein the elemental block is maximized over this single variable (See at least figures 7-10, column 3, lines 55-65, column 4, lines 15-40, column 11, lines 65-67, column 12, lines 1-20, column 13, lines 1-11 and 32-45, column 14, lines 15-26, and column 15, lines 1-15, wherein the equations are optimized based on constraints and preferences and the maximum of each product associated with the variables is determined for the wanted outcome (for example, lower costs, higher profit, etc.)).

24. As per claim 20, Dietrich et al. teaches a method wherein the optimum level of components to support the maximization are derived from the maximized elemental values (See at least column 7, lines 5-25, and column 8, table 1, wherein a vegetable omelet, for example, is vegetables and a plain omelet, and by maximizing products with subassemblies contained therein one maximizes and can determine the maximized resources as well).

25. As per claim 21, Dietrich et al. teaches a method for optimizing the multivariate amount of refinements produced from a level of resources, the method comprising:

configuring the refinements and resources in a representative refinement space plan that accounts for connectivities therebetween (See at least figures 7-10, column 3, lines 50-65, column 4, lines 15-40, column 6, lines 25-35 and 40-60, column 7, lines 6-25, column 9, lines 11-31 and 55-65, column 10, equations 1 and 2, lines 5-20 and 26-30, column 11, lines 65-67, column 12, lines 1-20, wherein a space plan that accounts for the relationships between refinements and resources is created. See at least figure 7 that shows the connectivities);

deriving an expected value function for the refinement space plan (See at least figures 7-10, column 3, lines 50-65, column 4, lines 15-40, column 6, lines 25-35 and 40-60, column 7, lines 6-25, column 9, lines 11-31 and 55-65, column 10, equations 1 and 2, lines 5-20 and 26-30, column 11, lines 65-67, column 12, lines 1-20, wherein an expected value function is formed);

converting the expected value function to a closed form expression (See at least figures 7-10, column 3, lines 50-65, column 4, lines 15-40, column 6, lines 25-35 and 40-60, column 7, lines 6-25, column 9, lines 11-31 and 55-65, column 10, equations 1 and 2, lines 5-20 and 26-30, column 11, lines 65-67, column 12, lines 1-20, wherein the expected value function is transformed into a closed form expression so it can be solved);

transforming the refinement space plan into a working space plan, with the refinements represented by transformed elements (See at least figures 7-10, column 3, lines 50-65, column 4, lines 15-40, column 6, lines 25-35 and 40-60, column 7, lines 6-25, column 9, lines 11-31 and 55-65, column 10, equations 1 and 2, lines 5-20 and 26-30, column 11, lines 65-67, column 12, lines 1-20, wherein the connections and relationships between products and resources represent a product space plan and this plan becomes a working plan in the equations created);

sequentially loading each element with resources that gate production of the element (See at least figures 7-10, column 4, lines 15-40, column 9, lines 11-31 and 55-65, column 10, equations 1 and 2, lines 5-20 and 26-30, column 11, lines 65-67, column 12, lines 1-20, column 13, lines 1-11 and 32-40, wherein each product is loaded with variables representing resources that control the outcome of the product);

sequentially re-loading components that were unloaded from elements in the loading step (See at least figures 7-10, column 4, lines 15-40, column 11, lines 65-67, column 12, lines 1-20, column 13, lines 1-11 and 32-40, column 14, lines 15-26, and column 15, lines 1-15, wherein subassemblies are reloaded as components);

merging elements that are further gated by components that were unloaded, with the loading, reloading, and merging steps resulting in an equilibrium configuration (See at least figures 7-10, column 3, lines 55-65, column 4, lines 15-40, column 11, lines 65-67, column 12, lines 1-20, column 13, lines 1-11 and 32-45, column 14, lines 15-26, and column 15, lines 1-15, wherein the equations produced are an equilibrium configuration); and

solving the equilibrium configuration to determine the optimization of the expected value function (See at least figures 7-10, column 3, lines 55-65, column 4, lines 15-40, column 11,

lines 65-67, column 12, lines 1-20, column 13, lines 1-11 and 32-45, column 14, lines 15-26, and column 15, lines 1-15, wherein the equations are optimized based on constraints and preferences and the maximum of each product associated with the variables is determined for the wanted outcome (for example, lower costs, higher profit, etc.)).

Claim Rejections - 35 USC § 103

26. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 11, 13, and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dietrich et al. (U.S. 5,630,070).

27. As per claim 11, Dietrich et al. discloses a method wherein the transforming step includes transforming and manipulating a matrix (See at least figure 8, column 4, lines 15-40, column 9, lines 11-31 and 55-65, column 10, equations 1 and 2, lines 5-20 and 26-30, column 11, lines 65-67, column 12, lines 1-20, column 13, lines 1-11 and 32-40). However, Dietrich et al. does not expressly disclose using an inverse Cholesky transformation.

Dietrich et al. discusses using matrices when manipulating and solving the mathematical expressions of the constrained resource allocation problem. Using an inverse Cholesky transformation to transform a matrix is well known in the art of matrix algebra and mathematics. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use an inverse Cholesky transformation on the matrix of Dietrich et al. in order to

reduce costs by more efficiently manipulating and solving the equations of Dietrich et al. By more efficiently solving the equations, run time will be reduced thereby saving costs.

28. As per claim 13, Dietrich et al. teaches a method wherein the demand distribution includes any multivariate demand distribution (See at least figure 8, column 4, lines 15-40, column 8, table 2, column 9, lines 11-31 and 55-65, column 10, equations 1 and 2, lines 5-20 and 26-30, column 11, lines 45-65, column 12, lines 1-20, column 13, lines 1-11 and 32-40). However, Dietrich et al. does not expressly disclose that the multivariate demand distribution is a member of the elliptical family of distributions.

Dietrich et al. discusses manipulating and solving the mathematical expressions representing multivariate constrained resource allocation problems. The elliptical family of distributions is well known in the art of mathematics. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to include the elliptical family of distributions in the distributions of Dietrich et al. in order to increase the ability of the tool to meet the needs of the user by adding mathematical features and techniques that are readily used in the word of mathematics.

29. As per claim 15, Dietrich et al. discloses a method wherein the transforming step includes transforming and manipulating a matrix (See at least figure 8, column 4, lines 15-40, column 9, lines 11-31 and 55-65, column 10, equations 1 and 2, lines 5-20 and 26-30, column 11, lines 65-67, column 12, lines 1-20, column 13, lines 1-11 and 32-40). However, Dietrich et al. does not expressly disclose using an inverse Cholesky transformation.

Dietrich et al. discusses using matrices when manipulating and solving the mathematical expressions of the constrained resource allocation problem. Using an inverse Cholesky

transformation to transform a matrix is well known in the art of matrix algebra and mathematics. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use an inverse Cholesky transformation on the matrix of Dietrich et al. in order to reduce costs by more efficiently manipulating and solving the equations of Dietrich et al. By more efficiently solving the equations, run time will be reduced thereby saving costs.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Beth Van Doren whose telephone number is (703) 305-3882. The examiner can normally be reached on M-F, 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tariq Hafiz can be reached on (703) 305-9643. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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September 10, 2004

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